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THE HYDRO-ELECTRIC SYSTEM IN TORONTO

BY H. C. HOCKEN,

Mayor of Toronto.

The city of Toronto has a municipally owned and operated electric light and power enterprise, known as the hydro-electric system of Toronto. Toronto is one of twenty municipalities in the province of Ontario which in coöperation with the provincial government have installed local distribution systems, which are supplied with power from Niagara Falls by the hydro-electric power commission of Ontario.

Public interest in the matter of utilizing Niagara Falls for the generation of electric power took formal expression in the year 1900, when a committee was appointed by the Toronto board of trade to investigate the question. The report of that committee stimulated public interest, and in the year 1902, many public meetings were held in the province of Ontario, to consider the best means of utilizing these resources.

The Canadian Manufacturers' Association and boards of trade throughout the province lent powerful support to the movement. In 1903 an act was passed by the Ontario legislature authorizing municipalities to inquire into, and if thought desirable, to establish municipal light and power works. Under the authority of that act a commission was appointed on behalf of the municipalities of Toronto, London, Brantford, Stratford, Woodstock, Ingersoll and Guelph, to carry out such an inquiry. This commission issued a report on the 28th of March, 1906, setting forth for the first time a reliable and reasoned exposition of the great value of Niagara Falls to this province as a source of electric light and power.

Subsequently, a further commission was appointed by the Ontario government to conduct inquiries on a larger scale into the question of utilizing in different districts throughout the province the water powers with which it abounds. A series of valuable reports was published by the commission, after prolonged and careful inquiries.

As a result, the hydro-electric power commission of Ontario was created by statute in the beginning of 1907, charged with the duty

of establishing for the benefit of the municipalities of the province all desirable generation works and transmission lines. This commission was originally composed of Sir Adam Beck, M.P.P. of London, Chairman; the Hon. J. S. Hendrie, M.P.P. of Hamilton; and W. K. McNaught, M.P.P. of Toronto; all highly capable, high grade and experienced business men. Subsequently the Hon. Mr. Hendrie was appointed lieutenant-governor of Ontario, and his place on the commission filled by the Hon. I. B. Lucas, provincial treasurer. The commission has constructed 110,000 volt transmission lines from Niagara Falls, via Hamilton to London in the West and to Toronto in the East, designed to serve the needs of the municipalities above mentioned and others contiguous thereto and is now constructing a line to Windsor. It has entered into a contract for the purchase at low rates of electric current from one of the generating companies now established at Niagara Falls, which it transmits over its own line to the various participating municipalities, each of which assumes responsibility for the construction and operation of its own local distributing system. The current is supplied to the municipal participants at cost, and they distribute it at cost among their own power and light consumers.

In coöperation with the governmental commission, the city of Toronto has constructed an independent civic distribution plant, designed to supply the city, the manufacturers and the citizens with electric light and power at cost. By act of the legislature, the administration of the civic distribution plant has been placed in the hands of a commission, now composed of Mr. P. W. Ellis (chairman); H. C. Hocken, the mayor of the city, and Mr. R. G. Black, electrical engineer.

The city of Toronto, being the commercial and manufacturing as well as the political capital of Ontario, is necessarily greatly interested in the question of maintaining its manufacturing supremacy.

Supported by an overwhelming body of public opinion, it decided in the year 1908 to build its own distributing plant to supply electric light and power at cost to the corporation services and to the manufacturers and the general body of citizens. A brief description of Toronto's civic plant and its progress to date may be of interest:

The physical plant consists of a terminal station and equipment at Strachan Avenue, where delivery is taken of the current

from the government commission at 110,000 volts and stepped down to 13,200 volts; a system of 13,200 volt sub-station feeders from the terminal station; eight principal sub-stations and necessary equipment located at carefully selected points throughout the city; a system of medium voltage city feeders running out of the sub-stations and covering the entire city area; secondary lines on every street in the city with pole lines projected for both sides of the streets; a 250-500 volt direct current system limited to a particular downtown area; and a complete equipment for lighting the grounds and buildings of the Canadian national exhibition and for supplying the needs of exhibitors.

The transformers installed and projected for the terminal station have a capacity of 33,500 h.p. while those installed and projected in the various permanent and temporary sub-stations have a capacity of 60,000 h.p.

The total estimated capital cost of the enlarged plant roughly described was \$4,500,000, exclusive of the cost of the terminal station and its equipment, which were erected at the expense of the provincial hydro-electric commission. The rate-payers have authorized the issue of debentures by the city of Toronto to the extent of \$4,950,000 for the purpose of meeting the capital expenditure involved. The debentures mature on the 1st of July, 1948, bear interest at the rate of four per cent per annum, and are issued subject to the condition that annual sinking fund payments adequate to their retiral at maturity shall be maintained. The rapid extension of the business of the system has rendered necessary an additional issue of \$700,000 and a further issue of \$1,000,000 is to follow in the near future, making in all \$6,200,000.

Some idea of the difference between the lines upon which the present plant is designed, and those upon which the first plant was designed, may be gathered from the fact that the first plant was estimated to cost \$2,500,000.

Apart from the municipal services there are four scales of rates in force, viz:—

(1) *For A. C. Residence Service.* A charge is made herein of 4 cents per month for each 100 square feet of main floor area, with a unit charge of 3 cents per kilowatt hour subject to 10 per cent discount for prompt monthly payment. These rates represent a

reduction of approximately 40 per cent from the old rates of the commercial competing company.

(2) *For A. C. Commercial Lighting Service.* A unit charge is made herein of 8 cents per kilowatt hour for the first 30 hours of maximum demand, with 3 cents per kilowatt hour for the excess monthly service, subject to a minimum charge of \$1 net per month and to discounts for prompt monthly payment of 10 per cent, 15 per cent and 20 per cent respectively, according as a one, three or five year contract may be entered into. These rates approximate 50 per cent below the old rates of the commercial competing company.

(3) *For A. C. Power Service.* A charge is made herein for the ordinary small manufacturers' service of \$1.35 per horse power per month for 10 horse power whether or not the current is used, plus \$1 per horse power per month for the excess consumption, plus a unit charge of $1\frac{1}{2}$ cents per kilowatt hour for the first 50 hours' service, plus 1 cent per kilowatt hour for the next 50 hours' service, plus $\frac{1}{2}$ cent per kilowatt hour for all excess service subject to discounts for prompt monthly payment and according to duration of contract, as above mentioned. These rates approximate 50 per cent below the old rate of the commercial competing company.

(4) *For Direct Current Power Service.* The rates charged herein are the same as for alternating current power service, with the exception that the unit rate per kilowatt hour is $2\frac{1}{2}$ cents for the first 50 hours' service, $1\frac{1}{2}$ cents for the next 50 hours' service, and $\frac{3}{4}$ cent for the excess service, subject to the same discounts and general conditions as the foregoing. These rates represent an approximate reduction of $33\frac{1}{3}$ cents below the old rates of the commercial competing company.

It is obvious, of course, that properly constructed rates must provide:—

- (1) For the whole of the operating expenses involved.
- (2) For the depreciation of the capital investment due to wear and tear and to the progress of invention; and
- (3) For the requirements of the sinking fund.

A commercial company always raises a large part, when not the whole, of the funds required to provide for construction expenditures by means of perpetual share capital. As the moneys so raised do not require to be returned to the shareholders, it is not necessary

in such cases to load the rates with sinking fund charges, designed to repay the capital. In the case, however, of a municipal undertaking, the conditions are entirely different. The undertaking has no capital as such. It is built out of the proceeds of debentures which require to be paid off at maturity. Unless the rates are loaded with an adequate sinking fund charge, the accumulation of which extinguishes the debt at maturity, it would require to be paid off at the expense of the rate-payers at large. It is sometimes suggested that to load the rates not only with an adequate allowance for the sinking fund obligations, but also with proper allowance for depreciation, is unfair and that such policy would impose such a burden upon any undertaking submitted to it that it would necessarily lead to disaster. But depreciation is a grim reality. No undertaking, whether commercial or municipal, can escape it. The world goes on improving its instruments and methods of production, rendering obsolete in consequence antecedent methods and instruments without regard to individual wishes. Wear and tear operate continuously upon all apparatus subjected to its influence, without regard to municipal resolutions or to doctrinaire theories.

The results so far have been entirely satisfactory. In the initial period of operations we had perhaps more than the usual difficulties. These proceeded from a keen and for a time it seemed implacable antagonism of vested interests who rightly or wrongly believed that they had a moral grievance against all who supported the municipal venture. The city offered to purchase the private company at a premium of 25 per cent on the stock, but the owners refused to sell, preferring to dispose of the property to another private syndicate. The futility of opposition, however, against a resolute will on the part of the public gradually made itself apparent and those special difficulties are now matters of ancient history.

At the beginning of October, 1914, we had approximately 30,000 completed services with a connected load of upwards of 80,000 horse power. The total current supplied to all consumers during the nine months ending September 30 was over sixty million kilowatt hours.

The quality and stability of the government transmission line and of the local distributing plant have been proved to be of the highest order. The power and light users of the Toronto municipal system have, therefore, enjoyed a continuous high grade service, and the result of this continuous high grade service is being shown

in a constant accession of business far beyond the expectations of the commissioners.

The street lighting has been so greatly improved that it is unthinkable that the city would ever tolerate again the old conditions. Toronto has an 80 candle lamp every 110 feet both sides of every street. Concrete poles of great durability and of pleasing design have replaced throughout the major part of the city the old unsightly wooden poles. The old arc lamps, suspended high overhead and casting deep and often treacherous shadows, have given place to modern tungsten lamps, with a soft and well diffused light, free of the shadows of the old. Over 40,000 of these lamps have been installed on the city streets, the main thoroughfares being lighted with well-designed cluster groups. As a result the streets of the city are beautifully lighted, and it is doubtful whether when the work is finished there will be any city on the continent as well lighted.

The financial results are no less gratifying. It was anticipated that the period of initial loss which every business has to go through while it is establishing itself in the confidence of its customers and building up its trade, would have lasted for a matter of two or three years. As a matter of fact, we ended the first full year of operation with a net surplus of \$13,555.41; the operations of the second year yielded a surplus of \$34,575; and we have every reason to anticipate for the present year, after providing interest, depreciation and sinking fund, a surplus of over \$100,000. Owing to the technical requirements of the first appropriation it has been necessary to pay sinking fund over the period of construction and the surpluses to date have been set aside for this purpose, which will likely be accomplished by the end of the present year.

The competitive effect of the establishment of the civic plant has not been destructive as was freely predicted at the time of its inception by its commercial competitors. The fact of the matter is that the potentialities of the power and light business are so great that few companies enjoying a monopoly thereof are alive to their possibilities. The rates of the competing commercial company in this city have been reduced to meet our own. There has been a very great advance in the quality of the service given to the citizens and a great increase in the activity and intelligence with which business is cultivated. The cheapening of the rates and the exten-

sion of the uses to which electricity is now put are having the effect of greatly increasing its total sale in this city, and province.

That the system is serving the masses of the people is proved by the fact that at the end of the year 1913 we had on our lines 500 three-roomed houses, nearly 1,000 four-roomed houses, the same number of five-roomed houses and nearly 5,000 six-roomed houses. At that time there were approximately 1,500 customers whose bills were, for at least eight months of the year, less than 50 cents per month. A further evidence of the increased use of electricity for domestic purposes is shown in the large number of electric appliances we have succeeded in selling in the "Hydro-Electric Shop." Our present results indicate that during the year 1914 we shall sell over 6,000 irons and very large numbers of toasters, heaters, vacuum cleaners, coffee percolators, washing machines, fans, etc.

The establishment of the civic system has not injured the privately owned company. But the use of electric power has increased enormously since the municipal system began operations. In 1910 the connected load of the Toronto Electric Light Company was 42,500 k.w., now the connected load of the two systems is 127,000 k.w., three times as much as it was five years ago. The result is that Toronto has the lowest average rate of any city in the world of 500,000 population or over. The electrical journal, quoted recently in the *Literary Digest*, gives these figures:

London, England.....	4.50
New York.....	5.20
Paris.....	10.20
Berlin.....	3.40
Hamburg.....	6.16
Chicago.....	2.18
Toronto.....	1.71

The effect of these low rates is that every new house that is built in the city of Toronto, no matter how small, is wired for electric light. The people find that they can enjoy this luxury at a price that, at least, does not exceed the price of gas, so that the low rates that are in operation, and which will be reduced in 1915 at least 10 per cent, bring electric current within the means of the humblest of householders of the city. One other feature of the municipal enterprise is the satisfactory results to those who are employed in operating the system. Without any dispute with the Union, wages

have been increased, not only on the civic system, but on privately owned systems, the latter being compelled to follow the public owned enterprise. An increase of wages was granted to the men this year upon a basis which must be considered satisfactory. The commissioners when approached by the men realized that if their requests were granted without the most careful consideration, they might be charged with unduly increasing the cost of labor to the enterprise. They, therefore, applied for a board of conciliation, which was appointed by the federal government. This board after taking evidence, gave a judgment fixing what they declared to be fair and equitable wages and upon this authority the local commission acted. It will be seen, therefore, that the question of wages has been adjusted by an impartial authority and by this means the greatest harmony maintained between the commission acting for the people at large and those who are employed upon the system.